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EXAMINER	
ELPENORD, CANDAL	
ART UNIT	PAPER NUMBER
2616	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/734,535	PORAT ET AL.	
	Examiner	Art Unit	
	Candal Elpenord	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6,9 and 11-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6,9, 11-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. **Claims 1,6** are rejected under 35 U.S.C. 102(e) as being anticipated by Badri et al (US 7,173,979 B1).

Regarding claim 1, Badri et al. discloses a method of creating a frequency diversity ("diversity effect by transmitting the information two or more times", recited in col. 15, lines 31) in a multicarrier OFDM signal ("multicarrier modulation symbols", recited in col. 29-51) to overcome impairment caused by periodic nulls in multipath channel, the method ("diversity effect by transmitting the information two or more times", recited in col. 15, lines 31) comprising: assigning redundant copies of each data bit ("transmitting of information symbol using a plurality of carries", recited in col. 3, lines 43-61, and "allocated to the information channel") to a plurality of carriers ("carriers, such as firs carrier, 32nd carrier, 128th carrier, and 256th carrier", recited in col. 10, lines 29-51) to create a non-periodic bit assignment wherein frequency intervals (1st and second time interval", recited in col. 3, lines 43-61) between carrier is different for each interval ("difference between the transmission symbol", recited in col. 3, lines 62- col. 4, lines 20).

Regarding claim 6, Badri et al. discloses a method of transmitting a message ("transmitting information symbols", recited in abstract, lines 1-9) comprising bits of data using a plurality of a multicarrier modulation symbols ("using plurality of subcarries", recited in abstract, lines 1-9) over a multipath channel that is resistant nulls at periodic frequency intervals to create frequency diversity ("diversity effect", recited in col. 5, lines 15-34) each symbol comprising a plurality of carriers capable of being modulated

with at least one data bit, the method ("transmitting information symbols", recited in abstract, lines 1-9) comprising the steps of:

(a) determining the number of data bits transmitted in each symbol ("extracting information symbol contained in the transmission symbols", recited in abstract, lines 9-14).

(b) selecting ("demodulating means", recited in col. 4, lines 66-col. 5, lines 14) from the message ("received transmission symbols", recited in col. 4, lines 66-col. 5, lines 14) a number of data bits equal to the number of bits transmitted in each symbol ("determining the information symbols from the transmission symbols", recited in col. 4, lines 66-col. 5, lines 14); and

(c) assigning each data bit ("transmitting the same information four times to a plural carriers such as firs carrier, 32nd carrier, 128th carrier, and 256th carrier", recited in col. 10, lines 29-51) plurality of carriers plural ("carriers such as firs carrier, 32nd carrier, 128th carrier, and 256th carrier", recited in col. 10, lines 29-51) wherein the separation ("difference of timing from first transmission to second transmission symbol", recited in col. 3, lines 62-col. 4, lines 19) of the carriers ("transmission of symbols using plural carriers", recited in col. 3, lines 62-col. 4, lines 19) carriers used to transmit each data bit ("transmission of symbols using plural carriers", recited in col. 3, lines 62-col. 4, lines 19) is non-periodic ("insertion of a protection interval in order to avoid interference of neighboring symbols", recited in col. 9, lines 29-47-since the symbols are orthogonal to each other, they are non-periodic).

4. **Claims 1-3** are rejected under 35 U.S.C. 102(e) as being anticipated by Joo et al (US 7,301,892 B2).

Regarding claim 1, Joo et al. discloses a method of creating a frequency diversity ("obtaining frequency diversity", recited in col. 8, lines 41-53) in a multicarrier OFDM signal (fig. 4, OFDM System, recited in col. 16, lines 33-40, "OFDM communication system", recited in col. 8, lines 30-40) to overcome impairment caused by periodic nulls in multipath channel, the method ("obtaining frequency diversity", recited in col. 8, lines 41-53) comprising: assigning redundant copies ("generating replica data by cyclically-circulating the input data", recited in col. 6, lines 60- col. 7, lines 6) of each data bit ("the input data", recited in col. 6, lines 60- col. 7, lines 6) to a plurality of carriers ("transmitted the same signal to with different carriers", recited in col. 11, lines 12-23) to create a non-periodic bit assignment (since the subcarriers are orthogonal to each other, thus they are non-periodic, recited in col. 18, lines 38-51) wherein frequency intervals ("subcarrier distance", recited in col. 12, lines 53- col. col. 13, lines 1-8) between carrier is different for each interval ("subcarriers separated by N/2", recited in col. 12, lines 53- col. col. 13, lines 1-8).

Regarding claim 2, Joo et al. discloses a method ("obtaining frequency diversity", recited in col. 8, lines 41-53) of allocating data bits to carrier for transmission in a multicarrier modulation symbol (fig.3 and fig. 4, "OFDM System", recited in col. 13, lines 63- col. 14, lines 7) which comprises a plurality of carriers (fig. 10, plurality of subcarriers, recited in col. 13, lines 20-35) each capable of being modulated (fig. 3, Modulator, 312, recited in col. 13, lines 63- col. 14, lines 13) with at least one data bit

("modulates of data bit", recited in col. 6, lines 60- col. 7, lines 6), to create frequency diversity and overcome impairment caused by periodic nulls in a multipath channel ("overcoming distortion due to multipath fading", recited in col. 6, lines 27-31), the method ("obtaining frequency diversity", recited in col. 8, lines 41-53) comprising the steps of:

(a) selecting a data bit from a message ("modulating a data bit and OFDM symbol", recited in col. 6, lines 60- col. 7, lines 6):

(b) redundantly assigning the data bit ("generating replicated data", recited in col. 6, lines 60- col. 7, lines 6) to a plurality of carriers (fig. 10, plurality of subcarriers, recited in col. 13, lines 20-35) comprising the steps:

(c) assigning the data bit to a plurality of carriers ("OFDM signal transmitted with different carriers", recited in col. 11, lines 10-23) comprising the steps of:

assigning the data bit to a second carrier ("replica carriers separated", fig. 10, plurality of subcarriers", recited in col. 13, lines 19-35) with a first carrier spacing from the first carrier ("subcarriers separated by N/2", recited in col. 12, lines 53- col. col. 13, lines 1-8);

(d) assigning the data bit to a third carrier ("replica carriers separated", fig. 10, plurality of subcarriers", recited in col. 13, lines 19-35) with a second carriers spacing from the second carrier that is different from the first carrier spacing ("subcarriers separated by N/2", recited in col. 12, lines 53- col. col. 13, lines 1-8); and

(e) repeating the steps of selecting data bits ("modulating a data bit and OFDM symbol", recited in col. 6, lines 60- col. 7, lines 6): and assigning data bits to carriers

until all data bits are assigned to carriers and all carriers ("transmission of replicated subcarriers separated by N/2", recited in col. 13, lines 19-35) have a data bit assigned,(, wherein the assignment of data bits to carriers produces non-periodic carrier spacing ("cyclically replication of OFDM symbol and received by a predetermined distance", recited in col. 8, lines 41-65) of carriers modulated by the same data bit (since the subcarriers are orthogonal to each other, thus they are non-periodic, recited in col. 18, lines 38-51).

Regarding claim 3, Joo et al. discloses a method ("obtaining frequency diversity", recited in col. 8, lines 41-53) wherein each carrier spacing ("distance calculated for OFDM symbol", recited in col. 14, lines 31-42) for each data bit is different from every other carrier spacing for the data bit ("subcarriers separated by N/2", recited in col. 12, lines 53- col. col. 13, lines 1-8).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. **Claim 4** is rejected under 35 U.S.C. 103(a) as being unpatentable over Joo et al (US 7,301,890 B2) in view of Badri et al (US 7,173,979 B1).

Regarding claim 4, Joo et al. discloses all the claimed limitation with the exception of being silent with regard to the following features: the method wherein the ratio of carriers to data bits is 16.

However, Badri et al (US 7,173,979 B1) in a similar field of endeavor discloses the method ("transmitting information using plural carriers", recited in abstract, lines 1-7) wherein the ratio of carriers to data bits is 16 ("number of bit to signal constellation and 16 possibilities", recited in col. 7, lines 40 - col. 8, lines 30). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the features of Joo et al. by using features as taught by Badri et al. in order to create error free transmission by transmitting information symbols using plurality of carriers (See Col. 3, lines 39-61 for motivation).

7. **Claim 11** is rejected under 35 U.S.C. 103(a) as being unpatentable over Joo et al (US 7,301,890 B2) in view of Tager et al (US 6,751,262 B1).

Regarding claim 11, Joo et al. discloses the OFDM method as recited in above paragraph.

Joo et al. disclose all the claimed limitation with the exception of being silent with respect to the following features: the method, wherein some of the carriers are zeroed out to avoid interference resulting from the transmitted.

However, Tager et al. in a similar field of endeavor discloses the method wherein some of the carriers are zeroed out ("zero crossings where the carrier frequencies can not overlap each other", recited in col. 2, lines 29-67) to avoid interference resulting from the transmitted ("use of zero crossing of carrier frequencies to eliminate interference", recited in col. 2, lines 26-67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the features of Joo et al by using features as taught by Tager et al. in order prevent carrier interference in an OFDM system.

8. **Claim 12** is rejected under 35 U.S.C. 103(a) as being unpatentable over Badri et al (US 7,173,979 B1) in view of Tager et al (US 6,751,262 B1).

Badri et al. discloses all the claimed limitation with the exception of being silent with respect to the following features: the method, wherein some of the carriers are zeroed out to avoid interference resulting from the transmitted.

However, Tager et al. in a similar field of endeavor discloses the method wherein some of the carriers are zeroed out ("zero crossings where the carrier frequencies can

not overlap each other", recited in col. 2, lines 29-67) to avoid interference resulting from the transmitted ("use of zero crossing of carrier frequencies to eliminate interference", recited in col. 2, lines 26-67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the features of Badri et al by using features as taught by Tager et al. in order prevent carrier interference in an OFDM system.

9. **Claim 9, 13** are rejected under 35 U.S.C. 103(a) as being unpatentable over Joo et al (US 7,301,890 B2) in view of Kleider et al (US 6,487,252 B1) in further view of Tager et al (US 6,751,262 B1).

Regarding claim 9,Joo et al. discloses an OFDM modulator (fig. 3, OFDM Modulator 312,recited in col. 13, lines 63- col. 14, lines 16) for transmitting a binary word in a symbol having a frequency diversity comprising: a ramp counter (fig. 5, Counter 515, recited in col. 14, lines 54 – col. 15, lines 6), and an amplitude mapper for producing I and Q carrier ("QAM", recited in col. 18, lines 53- 62) amplitudes for the signal selected bits (fig. 11, Complex Summer 1104, recited in col. 19, lines 48-54).

Joo et al. discloses all the claimed invention with the exception of being silent with respect to the following features: **regarding claim 9**, producing a series of bin number values, a look up table for mapping the bin number values to bit select values, the look up table comprising entries that produces assignment of bits to non-periodic carriers within the symbol; a data selector for selecting at least one bit from the binary

word according to each bit select value; and an amplitude mapper for producing I and Q carrier amplitudes for the signal selected bits.

However, Kleider et al. in a similar field of endeavor, discloses the following features: **regarding claim 9**, producing (fig. 2, Pilot Sequence Generator 108, recited in col. 3, lines 47-64) a series of bin number values ("frequency bins", recited in col. 3, lines 47-64, a look up table (fig. 2, Frequency Bin Assignment Table 110, recited in col. 3, lines 47-64) for mapping the bin number values ("assignment of the modulator symbols", recited in col. 3, lines 47-64) to bit select values (fig. 2, Assign Pilot Tones 108, recited in col. 3, lines 47-64), the look up table (fig. 2, Frequency Bin Assignment Table 110, recited in col. 3, lines 47-64) comprising entries ("frequency bin locations", recited in col. 3, lines 47-64) that produces assignment of bits to non-periodic carriers within the symbol ("assignment of pilot tones unevenly", recited in col. 2, lines 55-64); a data selector for selecting (fig. 3, Differential Decoder 32, recited in col. 4, lines 33) at least one bit from the binary word according to each bit select value (fig. 2, Assign Pilot Tones 108, recited in col. 3, lines 47-64). Therefore, it would have been obvious ton one of ordinary skill in the art at the time the invention was made to modify the features of Joo et al. by using features as taught by Kleider et al. in order to provide frequency synchronization (See abstract, lines 1-8 for motivation).

Joo et al. discloses the OFDM modulator as described in claim 9 above.

Joo et al and Kleider et al. discloses all the claimed limitation with the exception of the following features: **regarding claim 13**, the OFDM modulator further comprising

means for disabling the I and Q carrier amplitudes for a particular carrier and zeroing the transmitted energy for the carrier.

However, Tagger et al. discloses a method comprising means for disabling the I and Q carrier amplitudes for a particular carrier ("zero crossings where the carrier frequencies can not overlap each other", recited in col. 2, lines 29-67), and zeroing ("zero crossings where the carrier frequencies can not overlap each other", recited in col. 2, lines 29-67) the transmitted energy for the carrier ("use of zero crossing of carrier frequencies to eliminate interference", recited in col. 2, lines 26-67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the features of Joo et al with Kleider et al. by using features as taught by Tager et al. in order prevent carrier interference in an OFDM system.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yang et al (US 7,302,023 B2), Korobkov et al (US 7,206,350 B2), and Vijayan et al (US 6,151,296) are cited to show methods and system related to the claimed invention.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Candal Elpenord whose telephone number is (571) 270-3123. The examiner can normally be reached on Monday through Friday 7:30AM to 5:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kwang Bin Yao can be reached on (571) 272-3182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CE

KWANG BIN YAO
SUPERVISORY PATENT EXAMINER